FOREST PEST MANAGEMENT
Pacific Southwest Region

81 2045

Report No. 81-9

3430 Evaluation
June 17, 1981

PSW FOREST AND RANGE EXPERIMENT STATION
AUG 27 1981
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AN EVALUATION OF INSECT AND DISEASE CONDITIONS IN THE REDWOOD CREEK DRAINAGE, REDWOOD NATIONAL PARK

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ABSTRACT

Observations were made on a variety of insect and disease situations in the Redwood Creek drainage of Redwood National Park. This included alder flea beetle, Sitka spruce aphid, black stain root disease, and western gall rust. None of these were considered significant problems other than potentially on a localized basis. The major pest problem affecting growing trees is the high level of competition, both from the dense stocking and the excessive brush. Hazardous trees may be a problem in the Lady Bird Johnson Grove and along the trail to the Tall Trees Grove.

INTRODUCTION

On May 11-13, 1981 we visited with Ron Mastrogiuseppe of Redwood National Park to examine a variety of forest insect and disease situations that exist or have the potential of developing into problems in the south zone of the park. The areas we looked at were along sections of Bald Hills Road, Holter Ridge Road, K&K Road, C-line on the east and west side, New Access Road, and Davison Road to Gold Bluffs Beach. In addition, observations were made at the Lady Bird Johnson Grove and the Tall Trees Grove.

This evaluation was initiated because of the Park's concern about the impact of black stain root disease on Douglas-fir and the effect of certain management practices on the disease. Therefore, one of the principal objectives of the trip was to look for the disease in the Park and to provide technical assistance to Park personnel. In addition, we made a number of other observations in and around the Park on a variety of organisms. Because the organisms affect different hosts and do not interact, we will discuss each separately.

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BLACK STAIN ROOT DISEASE

This disease on Douglas-fir has had limited research and, therefore, some of the information that follows is speculative and is based on what is known about the disease on other hosts. In the Redwood National Park the sole known host of the fungus is Douglas-fir. The fungus, Ceratocystis wageneri, which causes black stain root disease, is a native pathogen of the western United States. It can infect and kill any age or size of tree by invading the roots and functioning as a vascular wilt, blocking water transport to the crown. Once established in a tree, the fungus grows through the xylem tissue, colonizing the roots. The fungus spreads locally by growing across root contacts or possibly for short distances (centimeters) through the soil to invade small rootlets of surrounding trees. This type of spread results in the formation of expanding infection centers with older dead trees in the center and newly infected living trees around the perimeter.

Initiation of infection centers is believed to be the result of feeding and breeding by certain bark beetles on the roots of weakened Douglas-fir. These beetles carry spores of the fungus from infected to uninfected trees. They appear to be attracted to disturbed areas where fresh stumps or damaged and stressed trees are present for breeding. This may explain why the disease is often found near disturbed sites.

During our trip we identified several small black stain centers where sapling Douglas-fir were being killed. These were along Bald Hills Road, K&K on the east side, and Holter Ridge Road. No disease was evident in the thinning plots established along Holter Ridge Road by Steve Veirs. Neither was there any evidence of black stain root disease near the old growth Douglas-fir and redwood along Bald Hills Road. In addition to these observed locations, we know that the disease is present in and around the thinning plots established by Humboldt State University on former Louisiana-Pacific land along B-line road.

No conclusive control methodology has been established for the disease in Douglas-fir. However, by extrapolating our knowledge from pine to Douglas-fir we believe that felling all infected Douglas-fir and a buffer of surrounding healthy Douglas-fir would stop the spread of the fungus in a center. The fungus would then be expected to die out in the site in several years permitting revegetation by the host (Douglas-fir). Of course, non-host vegetation could be maintained during this period. At present, the best estimate on width of the buffer strip is 75 feet (23 meters). This is the distance to remove hosts beyond the outermost known infected trees.

Not attempting to control the disease within established centers will result in continued mortality of Douglas-fir. It can be expected that these centers will expand until natural barriers (e.g., a stream course, road, change in vegetation) are encountered. Those root disease centers in dense thickets of sapling Douglas-fir will have an easy opportunity to expand because of the high number of rootlet contacts. Rate of expansion is estimated at 4 to 8 feet per year (1.2 to 2.4 m). Disease centers will likely be revegetated by non-host shrub species that will serve as strong competitors to any tree regeneration.

One of the concerns of Park personnel is the possible increase in the incidence of black stain root disease as a result of thinning dense, young Douglas-fir stands. We have observed the disease in thinned stands in other situations on a very limited basis. However, we have also found the disease in very dense thickets of Douglas-fir. It does not seem, therefore, that by not thinning, further introduction of the disease will necessarily be reduced. Also, the minimal number of black stain-infected Douglas-firs in the Park would indicate a low level of fungal inoculum and/or a small population of insect vectors. Black stain root disease should not be a major reason for restricting thinning activities in young Douglas-fir stands. Competition and stagnation in unthinned stands may have a greater effect than the disease would have in thinned stands.

WESTERN GALL RUST

Western gall rust, caused by Endocronartium harknessii, is heavy in the Monterey pine plantation near New Access Road. The fungus is presently killing the lower branches of larger trees and entirely killing some smaller, suppressed individuals. This type of branch and tree killing in the lower parts of the canopy will continue until the crowns gain height and the canopy opens. The plantation, however, will persist.

This is a rust fungus that produces orange pustules of aeciospores on the galls in spring. The aeciospores directly reinfect pines. The disease is known only to affect two- and three-needled pines and can appear particularly severe in Monterey pine plantations. The spring and early summer fog and high humidity in Redwood National Park contributes to the buildup of the disease.

This fungus will not eliminate the Monterey pine, nor should it adversely affect native vegetation in the Park. However, in future years the dense Monterey pine plantation may invite other pest problems, such as Monterey pine Ips.

ALDER FLEA BEETLE

Part of the Park's program to rehabilitate logged areas includes planting alder seedlings along steep drainages. Alder flea beetles, Altica ambiens, are damaging these small seedlings. The beetles are also feeding on larger trees throughout the area, but without causing excessive harm. The threat to small seedlings is much greater because of the small-sized crown and the exposed location, which seems attractive to the beetle in the early summer.

The alder flea beetle produces one generation per year. Both larvae and adult beetles feed on the host. Overwintering beetles emerge from hiding in the spring and feed on alder foliage, where they also deposit eggs before they expire. Larvae, hatching from these eggs, mature in August, and then pupate in the duff on the ground. The new adult beetles develop from pupae in about 10 days and feed voraciously on alder foliage for the remainder of the growing season. The beetles then migrate to the ground and overwinter in protected situations in the duff.

There appears to be no preventive or remedial action available, other than the application of pesticides, to mitigate this problem. Removing straw and duff from around the planting probably would have no effect because the beetle could easily migrate in from adjacent natural alder stands.

The late seasonal feeding by new adults may not be continued in the warm, exposed sites favored in the spring, so seedlings may escape this severe, late-summer defoliation. Alder planting should be checked again this fall to see if planted alder seedlings can survive the threat of destruction by this insect.

SPRUCE APHID

Many severely stressed Sitka spruce trees are evident from Highway 101 between McKinleyville and Big Lagoon. The lower and inner crown of the trees are defoliated and some trees have been killed. Evidence of aphid infestation can be found upon close examination of the trees. The defoliation reportedly has been noticeable for about four years. The damage extends into portions of the Park and could eventually have some impact on scenic values and safety, due to hazard trees resulting from tree mortality.

The spruce aphid, Elatobium abietinum, is a serious pest of spruce along the coast of North America from Alaska to California. Extensive killing of spruce has been attributed to sporadic outbreaks of this aphid. Large numbers of aphids may be present in late winter and early spring, sucking sap from the needles. Old needles and lower crowns are preferred and the needles drop from the trees after being fed upon. Heavy populations can defoliate trees to the point of causing mortality. Epidemics are reported to be short-term. Means of prevention or control of defoliation have not been developed other than by insecticide application for ornamental trees.

Another conifer aphid is also quite prevalent in the Park. This is the Cooley spruce gall aphid, Adelges cooleyi, which causes large, unsightly galls on spruce foliage and small cottony masses on Douglas-fir foliage. Neither host tree is usually seriously affected.

TANSY RAGWORT

The biological control of a toxic weed, tansy ragwort, is of some interest to the Park. Among several control techniques for suppressing this weed is the importation of insect enemies such as the cinnabar moth and tansy flea beetle. Some Park programs might conceivably interfere with the biological control effect, such as control burning or changing grazing practices within the Park. However, this is admittedly unlikely.

The use of beneficial insects to control weeds has been quite noteworthy in California. State and county agriculture officials are very knowledgable sources of information concerning biological weed control.

LADY BIRD JOHNSON AND TALL TREES GROVES

We walked through both of these areas during our visit and noted no insect or disease problems. A problem that does exist, though, is the safety risks posed by hazardous trees. In both groves, standing dead trees are located along public trails. The amount of hazard potential depends on the probability of tree failure and the probability that a target (i.e., a hiker) is within striking range. Decisions on removing hazardous trees must be made on the ground.

Certain tree species within the groves are more likely to fail, especially after tree mortality. Grand fir is highly susceptible to decay of both the roots and bole. Efforts should be made to remove dead and dying individuals of this species as rapidly as possible in potentially hazardous situations. Decay potential of tanoak, Sitka spruce, Douglas-fir, and western hemlock is less than for grand fir, but should still be of concern, expecially in dead trees. Dead redwoods are relatively safe from toppling for a number of years, but large branches may be hazardous, especially during windy periods. Additional criteria for identifying hazardous trees are available in the enclosed publication by Wagener.

SUMMARY

The situations we observed in the Redwood Creek drainage are interesting, but should not have major impact on Park management and rehabilitation. Certain of these situations may become problems in localized areas, but Park personnel should be able to deal with these on a limited basis.

The pest problem that does exist in much of the Park is the high levels of vegetation, both from dense tree stocking and excessive shrubs. Growing trees will be impeded as long as the competition remains severe. This will be especially important during regeneration attempts. Vegetation management will be necessary if the attempt to return the Park to near its original state is to be successful.

The Forest Pest Management Staff is available to the Redwood National Park to provide additional information and assistance on forest insects and diseases in the future. Please feel free to call us (FTS 556-6520) if you have any questions about this report or would like additional assistance.